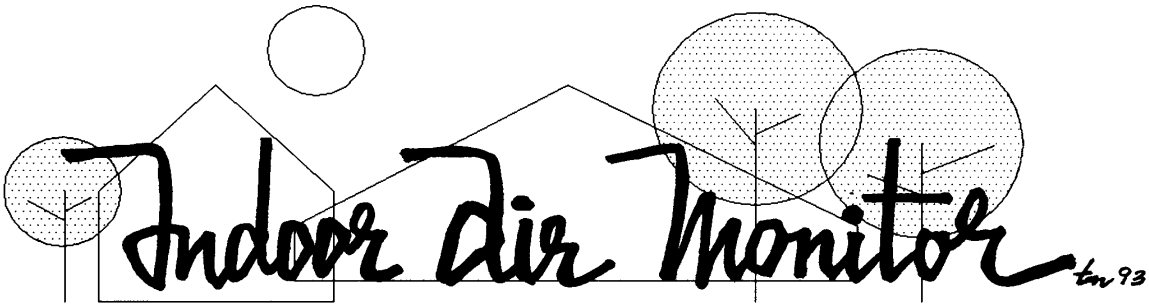

VOL.5, NO. 4 INDOOR AIR MANAGEMENT NEWSLETTER OCTOBER 1997

Naval Facilities Engineering Service Center

INSIDE THE IAM:

FROM THE EDITOR

Lost and Returned… The last issue of the IAM was sent via first class mail, instead of bulk mail. By spending a little more money we hoped that our newsletter would get to our readers on time. However, we were hit with a lot of returned mail due to moving personnel and base closures. You can help by notifying us of address changes or subscription cancellations.

E-newsletter… Finally, we got the green light to send the IAM via electronic mail (e-mail). The January 1998 issue will be the first issue available for electronic transmission. If you want to receive the IAM via e-mail, please send e-mail to 'iam@nfesc.navy.mil'. Include the information requested on the subscription form which can be found on the last page of this newsletter. Note that the electronic version of the newsletter will initially be available only in MS Word for Window 95, version 7.

Readers Contribution… We would like to thank all who sent comments, suggestions and articles to the IAM. Readers contribution are always welcome. We are looking for articles on success stories, lesson learned, technical advances, or other stories related to indoor air management. Also, if you have any suggestions to improve the IAM, or a question about Industrial Ventilation, Asbestos, Lead Based Paint, or Indoor Air Quality, please send it to our email address iam@nfesc.navy.mil.

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ELEMENTS OF THE METHYLENE CHLORIDE (MC) STANDARD

IH's are you ready? Because the U.S. Navy must comply with this standard reducing exposures to MC, we are printing, with permission, this summary from J.J.Keller's Industrial Safety Report. Our initial action comes in October this year with monitoring.

Start-up dates

The rule becomes effective April 10, 1997 with the following start-up dates:

Initial monitoring (d)(2):

Employers with fewer than 20 employees, within 300 days after the effective date.

Polyurethane foam manufacturers with 20 to 99 employees, within 210 days after the effective date.

All other employers, within 120 days after the effective date.

Engineering controls (f)(1):

Employers with fewer than 20 employees, within three years after the effective date.

Polyurethane foam manufacturers with 20 to 99 employees, within two years after the effective date.

All other employers, within one year after the effective date.

All other requirements:

Employers with fewer than 20 employees, within one year after the effective date.

Polyurethane foam manufacturers with 20 to 99 employees, within 270 days after the effective date.

All other employers - within 180 days after the effective date.

Exposure limits

8-hour time-weighted average (TWA) permissible exposure limit (PEL) of 25 parts per million parts air (ppm).

Short-term exposure limit (STEL) of 125 ppm over a 15-minute period.

Action level of 12.5 ppm over an 8-hour TWA.

Exposure monitoring

Requires air monitoring initially and when conditions change in the workplace. Affected employees can observe the monitoring and must be given written results within 15 working days.

Regulated areas

Requires employer to set aside and mark areas wherever airborne exposures exceed PEL or STEL to limit access to authorized persons only.

Respirators must be worn when MC levels exceed the PEL or STEL.

At multi-employer worksites, all employers must be notified of hazard.

Methods of compliance

Requires the employer to use feasible engineering and work practice controls to achieve PEL and STEL or reduce exposures as much as possible.

Employee rotation as a compliance means is prohibited.

Leak and spill detection procedures must be in place.

When necessary, a respirator program must be implemented.

Appropriate personal protective equipment must be provided by the employer. Where splashing or spilling could occur, washing facilities and emergency eyewash stations must be nearby.

Medical surveillance

Initial and periodic medical screening is required for affected employees.

Emergency medical treatment must be available.

Hazard communication

Requires that affected employees are made aware of

the hazards associated with MC exposure in accordance with OSHAs hazard communication standard, and that initial training and retraining, when necessary, is provided.

Recordkeeping

Objective data used in place of monitoring must be maintained.

Records of monitoring are required to be kept for 30 years.

Medical screening and surveillance records must be kept for the duration of employment plus 30 years.

Appendices

Three appendices that provide additional information and guidelines are included with the rule.

Note: ( ) Paragraphs cited are from the regulation printed in the 10 January 1997 *Federal Register*.

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OSHA ISSUES HAZARD INFORMATION BULLETIN (HIB) ADDRESSING WOOD DUST COLLECTORS

On 2 May 1997 OSHA issued a Hazard Information Bulletin (HIB) titled "Improper Installations on Wood Dust Collectors in the Woodworking industries." By issuing the HIB, OSHA raised the awareness of the issue among their inspectors and consultants. The Navy has dust collectors located indoors in many locations. If this is a condition on your facility, you might consider applying for Hazard Abatement funds to mitigate a potential explosion hazard if local fund are not available

The HIB warns that cyclone dust collectors located inside buildings are illegal. This is a violation of NFPA 664, *Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities*, which we addressed in previous IAM issues. Exemptions are (1) if the system complies with NFPA 69, *Standard on Explosion Prevention Systems*, or (2) if the system is located adjacent to an exterior wall or vented to the outside through 10 feet of straight duct and has explosion vents.

Check out NAVFAC's Web Page at http://www.navy.mil/homepages/navfac/env/
safety/safety.htm for information on the HA program including the forms and guidance on completing the forms. Alternatively, contact Kappy Paulson via e-mail at kpaulso@nfesc.navy.mil.

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WHAT YOU NEED TO KNOW ABOUT ASBESTOS MANAGEMENT

The first regulations governing asbestos were issued under the National Emission Standards for Hazardous Air Pollutants (NESHAPS) authorized by the Clean Air Act (40 CFR 61) in 1973. The second set of regulations is in the "Friable Asbestos-Containing Materials in Schools; Identification and Notification Rule," (40 CFR Part 763), promulgated under the Toxic Substances Control Act, otherwise known as Asbestos Hazard Emergency Response Act of 1986 (AHERA).

In 1986 the Chief of Naval Operations (CNO) mandated that activities would complete activity asbestos inventories by 1990. Another policy (Federal Property Management Regulation 101-47.202-2), regarding base closure and mandated in 1992, requires completion of asbestos inventories and abatement of damaged, friable, and accessible ACM. The policy also requires the establishment of an Asbestos Management Plan to maintain the material in place until abatement. The Navy requires activities develop and implement an asbestos Operations and Maintenance (O&M) program through OPNAV Instruction 5100.23D.

Many of the original inventories performed to comply with requirements were incomplete or inaccurate. These problems are attributed to a lack of experience in the infancy of the industry. Eleven years later much needed practical and working experience is available to customers. Many facilities managers are requiring complete asbestos inspections prior to renovation projects. These inspections allow destructive testing and are therefore more thorough than original assessments. The cost benefits are seen in fewer asbestos related change orders in the performance of the renovation contract. Some customers are taking advantage of

benefits obtained from having new asbestos inspections performed. Many materials were assumed to contain asbestos in the original assessments and therefore require maintenance and surveillance under an O&M program. In some instances these materials are removed as ACM without laboratory testing to confirm the presence of asbestos. Funds, for correcting occupational, safety and health deficiencies, are available through the Naval Occupational Safety and Health (NAVOSH) Hazard Abatement Program.
PWC Pensacola has experienced and qualified inspectors, management planners, abatement designers, and abatement crews. Services also include in-house laboratory analysis, posting and labeling of ACM, and building occupant training.

For additional information regarding asbestos services contact Rich Harris via e-mail at npwc468@aol.com.

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ASBESTOS RECORDKEEPING

In the April 1997 issue of the IAM we reported the cancellation of SECNAVINST 5212.10B, requiring indefinite retention of all insulation/asbestos related records. This has raised numerous questions on what asbestos records need to be kept and for how long. With the cancellation of the SECNAVINST we can no longer rely on the old standby that asbestos related records must be kept forever.

While the cancellation of the SECNAVINST is a significant change in policy, it does not release activities from keeping many asbestos related records. In fact, records on the location of asbestos materials or materials proven to be non-asbestos must be retained indefinitely per OSHA regulations. Attached is a summary of the asbestos records to keep and how long they should be retained. Additional records which aid in managing asbestos and implementing an asbestos operations and maintenance plan should also be kept indefinitely.

For additional information contact Jill Hamilton via e-mail at 'jhamilt@nfesc.navy.mil'.

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CARBON MONOXIDE IN THE INDUSTRIAL ENVIRONMENT

Carbon monoxide (CO) is a colorless, odorless gas created by incomplete combustion of carbon containing material. CO in the industrial environment is frequently produced by internal combustion engines, forges, blast furnaces and coke ovens. Occupations that OSHA reported CO exposure as likely are acetylene workers, blast furnace workers, boiler room operators, carbon black makers, coke oven workers, diesel engine operators, dock workers, garage mechanics, metal oxide reducers, organic chemical synthesizers, steel workers and warehouse workers.

Administrative and engineering controls should be used to prevent or reduce employee exposure to CO. Suggestions OSHA gives to reduce CO emissions in the workplace are to maintain appliances, flame burners and motor vehicle exhaust systems. Use battery powered equipment instead of internal combustion engines when feasible. In warehouses electric forklifts are better because they do not produce CO and also produce less noise. Install an effective ventilation system. Investigate indoor air quality problems promptly.
CO has no detectable odor or warning properties to indicate breakthrough to the wearer of an air purifying respirator. Negative pressure air purifying respirators should not be used for CO unless the respirator cartridges are designed for CO and they have an effective end-of-service-life indicator (ESLI) according to NIOSH *Guide to Industrial Respiratory Protection,* Appendix A. If respiratory protection is necessary a supplied air respirator with a full face mask operated in the continuous flow mode or a self contained breathing apparatus (SCBA) with a full face mask is recommended according to ANSI Z88.2-1992, paragraph 7.2.2.2m and NIOSH *Guide to Industrial Respiratory Protection,* Appendix C. If the CO concentration is unknown or at or above the immediate danger to life or health (IDLH) level of 1200 parts per million (ppm) then an SCBA with a full face mask operated in the continuous flow mode must be used.
CO is an asphysiant. At low levels CO can cause headaches, nausea, and dizziness. CO poisoning may also cause confusion and a flu like syndrome. Higher concentrations may result in brain or heart damage or death. If the CO dose is high enough, it can kill in minutes. Warn-

ing signs of CO poisoning are headache, tightness across chest, nausea, drowsiness inattention, fatigue, lack of coordination and weakness. CO is easily taken up by the bloodstream from the lungs during respiration. CO forms carboxy hemoglobin in the blood which reduces the body's ability to carry oxygen. Hemoglobin has a greater affinity for CO than oxygen, thus CO is taken into the blood stream more readily than oxygen.

Carbon monoxide is also a reproductive hazard. Some studies referred to by OSHA have shown exposure to a pregnant woman that is not lethal to the mother may be lethal to the unborn child.

OSHA's Permissible Exposure Limit (PEL) for an 8 hour time-weighted average (TWA) is 35 ppm and the ceiling PEL is 200 ppm in a 15 minute period. The American Conference of Governmental Industrial Hygienists (ACGIH) recommends a threshold limit value of 25 ppm for an 8 hour TWA according to the *1996 Threshold Limit Values and Biological Exposure Indices*.

For more information, contact Vince Fabris, ESC 425 via e-mail at 'vfabris@nfesc.navy.mil'.

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IAM CONNECTION

IAM. There are plans to replace the old carpet in a club house. The carpet mastic is negative for asbestos. However, the floor tile and floor tile mastic, that the carpet is laid on, is positive for asbestos. The floor tile does not appear to be friable. The project engineer showed me how easily the carpet pulls up off the carpet mastic. I easily lifted up a small section of the old carpet, leaving the layer of carpet mastic on the ACM floor tiles. None of the floor tiles appeared disturbed. The proposal is NOT to engage in ACM-abatement work. They agreed to wet down the carpet, wear the asbestos masks, and cease work if they started pulling up or otherwise disturbing more than 10 square feet of floor tiles. Is this acceptable and in compliance with OSHA requirements? Ann Garner, Camp Butler, Okinawa, Japan.

Ms. Garner. Please add the following steps to your proposed procedure. These steps are recommended by the National Institute of Building Sciences (NIBS).

- Pull carpeting slowly and HEPA vacuum exposed flooring and back of carpet.
- Remove carpet in pieces no larger than 200 square feet (18.6 m2).
- If carpet and adhesive are non ACM, roll up carpet and dispose as non-ACM waste. If portion of the flooring remain attached to carpet backing, dispose of carpet as ACM or accordance with applicable regulation.
- HEPA vacuum surface of flooring after carpet is removed.
- Allow substrate to dry before installing new flooring.

Refer to the work practice R8, in the NIBS *Guidance Manual, Asbestos Operations & Maintenance Work Practices*, for the complete procedure.

IAM. What are the regulation requirements when it comes to lead-based paint training?

Readers. Lead-Based Paint (LBP) training regulations can be found in 40 CFR 745, *Lead; Requirements for LBP Activities in Target Housing and Child Occupied Facilities*. It is important to note the title of this standard, and who it's intended for: Target Housing and Child Occupied Facilities.

Target housing is defined as any housing constructed prior to 1978, except housing for the elderly or persons with disabilities, or any zero bedroom dwelling. A child-occupied facility is defined as a building, or a portion of a building, constructed prior to 1978, visited by the same child, 6 years of age or under, on at least 2 different days within any week, provided that each days visit lasts at least 3 hours, the combined weekly visit lasts at least 6 hours, and the combined annual visit lasts at least 60 hours. Therefore, any facility that does not fall under these two definitions is not covered by this standard. The EPA claims that this may change in the future.

There are five training programs defined by EPA. They can be found in 40 CFR 745.225(c) & (d) and include:

1. Inspector: Performs inspection, including selection of rooms and components for sampling.

2. Risk Assessor: Performs visual inspection for the purpose of identifying potential sources of LBP hazards.
3. Supervisor.
4. Project Designer: Developments and implements an occupant protection plan for large scale abatement projects.
5. Abatement Worker.

Again, these training disciplines are for Target Housing and Child Occupied Facilities. However, it would be wise to have employees performing work at industrial or non-housing facilities receive the EPA training in their discipline.

For construction work (at housing or non-housing), work for construction alteration or repair, including painting and decorating, the regulations fall under 29 CFR 1926.62, *Lead Exposure in Construction*. If any construction work is performed on paint that contains any amount of lead, you must comply with this standard. Annual training is required for each employee who is subject to lead exposure at or above the action level on any day. Training requirements can be found in 29 CFR 1926.62(l).

IAM. Is point counting a specific requirement for bulk samples? Our contract lab says they do not perform point counting routinely for 1% or <1% asbestos, unless specifically requested. However, there is a local AHERA training provider who states that this was a requirement for both friable and nonfriable samples. Matt Luber, PWC Pearl Harbor, HI.

Mr. Luber. Point counting is not a requirement for analyzing bulk samples. The option to use point counting is left up to the building owner. EPA provided some clarification on point counting in May 1991. It stated:

a. A sample in which no asbestos is detected by polarized light microscopy (PLM) does not require point counting. However, prepare a minimum of three slide mounts and examine them in their entirety before making this negative determination.

b. If the analyst visually estimates the amount of asbestos in a sample to be less than 10%, the building owner/operator may (1) assume the amount to be greater than 1% and treat the material as ACM, or (2) verify the amount by point counting.

c. When a result obtained by point counting and visual estimation differ, use the point counting result.

IAM. Does the new ANSI Standard require HEPA-filtered vacuum cleaners for ALL clean up jobs around an abrasive blasting operation? Bernie Pevo, NMC Point Mugu

Mr. Pevo. No, ANSI Standard 9.4-1997, *Abrasive Blasting Operations*, states: "Where toxic materials (e.g., heavy metals such as lead) are present on the dust, a high-efficiency particulate air filtered (HEPA) vacuum cleaner shall be used for cleanup, and the cleanup preferably should be conducted at a time when the work area is not in operation".

The standard goes on to remind the user that proper PPE is required during cleanup. Many Navy operations will be required to purchase a HEPA vacuum cleaner because our current abrasive blasting operations tend to produce dust with heavy metal content such as cadmium and hexavalent chromium.

IAM. As a safety professional, how do I get the folks in public works to perform preventative maintenance, including duct cleaning, on our ventilation systems. Perry Corbett, Military Sealift Command Pacific

Mr. Corbett. Unfortunately, there is no "hammer" in the form of federal or Navy regulations that require the ventilation system be maintained within a particular performance range. Military Handbook 1003/3 *Heating, Ventilating, Air Conditioning, And Dehumidifying Systems* gives design criteria but the manual does not address long term quality of the HVAC system. NAVFAC MO-322, Volume I, *Inspection of Shore Facilities*, gives Level of Maintenance Codes to all our buildings (refer to table on next page). One maintenance code of interest to you is Code C, "Substandard construction or future active life of less than 3 years." The MO recom-

mends (1) “Limited maintenance on basis of planned remaining useful life, (2) “Eliminate fire, health, and safety hazards”, (3) “Patch and reinforce instead of replacing wherever economical” and, (4) “Consider breakdown maintenance.” You might be able to tie the need for duct cleaning and HVAC maintenance to health and safety issues such as increased absenteeism due to respiratory inflections commonly related to poor HVAC systems. However, it will be difficult because only a few employees contact their physician when they get a cold or flu. Very few physicians conduct tests to determine which strain of bacteria or virus caused the malady.

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Table 2-1 from MO-322		
LEVEL OF MAINTENANCE CLASSIFICATION (LMC) CODES		
Code	Classification Characteristics	Level of Maintenance
A	- Vital to mission - Active future of over 10 years	- Maintain economically to assure full safe and efficient support for an indefinite period.
B	- Important to mission - Active future use of 3-10 years	- Maintain economically to fulfill mission for the duration of facility life or mission.
C	- Limited importance to - Substandard construction or future active life of less than 3 years - Infrequently or only partially used	- Limited maintenance on basis of planned remaining useful life - Eliminate fire, health, and safety hazards - Patch and reinforce instead of replacing wherever economical - Consider breakdown maintenance
D	- Inactive facilities (required during mobilization)	- Limited maintenance to assure weather tightness, structural stability, protection from fire or erosion - Eliminate safety or health hazards - Minimal maintenance to permit reactivation within the period prescribed under mobilization plans
E	Surplus Facilities	- Eliminate fire, safety, and health hazards - Prevent pilferage effecting final disposal action

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CORRECTION TO FREQUENTLY ASKED LEAD-BASED PAINT QUESTIONS

The July 1997 issue of the IAM included an article addressing some commonly asked questions about exposure to lead and lead-based paint. However, this previous article was an early draft that contained some technical and procedural errors. Therefore, the information has been corrected, and the first part of the article is printed below. Part two will be published in our next issue. We are sorry for any inconvenience this may have caused.

Sources of Lead

Q1. What are the most common sources of lead?
A1. The most common sources of lead are peeling

paint and chipping plaster from pre-World War II homes which contain high levels of lead. Other sources of lead are soil and dust with high levels of lead resulting from leaded gasoline exhaust; old toys or furniture painted with lead-based paints; improperly glazed pottery; cigarette butts; matches; and paper containing colored inks. Home remedies and home-made distilled alcoholic beverages ("moonshine") often contain lead due to their methods of preparation.

Q2. Does the Navy have housing that contains lead-base paint?

A2. Navy family housing built before 1978 is likely to contain lead-based paint or lead-based painted surfaces. This problem is not unique to the Navy and Marine Corps. Lead has been used in paint literally for centuries due to its improved pliability, adherence, and toughness. Approximately three-quarters of the nation's housing stock built before 1978 contain lead-based paint.

Q3. Where is lead-based paint most commonly found?

A3. The most common areas are baseboards, trim, window sills and frames, and door frames. Paint layers on walls of homes built before 1960 may also contain lead.

Navy's Pediatric Program

Q4. How can exposure to lead effect health?

A4. At low levels of exposure there are no symptoms. Higher levels of exposure can result in behavior and learning problems, anemia, headaches, slowed growth, and muscle and joint pain. Very high levels of exposure will cause forced vomiting, dizziness, coma and convulsions.

Q5. What actions can be taken once lead exposure has occurred?

A5. Identification and removal of the sources of lead is normally the only required action.

Q6. What can I do to protect my child from lead exposure?

A6. Become aware of potential sources of lead exposure and remove them from your child's environment. Additionally, you can ensure that your child is screened for risk of lead exposure by your Navy clinic.

Q7. What does the screening involve?

A7. The Navy has a screening program for children up to six years of age. You will be asked to complete a questionnaire which will help clinic staff determine if you child is at risk of exposure to lead.

Almost 99% of Navy children tested have blood lead levels safer than the limits established by public health agencies. In such cases, no other procedures are need to be done, except for updating of the questionnaire during your child's regular well visits.

If, as a result of the screening questionnaire, your child is believed to be at risk for lead exposure, your health professional will talk with you further to determine potential sources of lead, and may counsel you on steps you can take, like housekeeping procedures, to minimize lead exposure.

Your health professional may also draw a small amount of blood using a fingerstick. This test will indicate if blood lead levels are within the limits established by public health agencies or if additional testing is required. The clinic will continue to follow your child's status or you may be referred to another clinic or hospital for any necessary treatment.

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PRACTICES TO REDUCE CADMIUM OR LEAD EXPOSURE

Various industrial operations performed by Navy personnel potentially expose the employees to lead or cadmium. Typical operations where employees may be overexposed to lead are lead abatement work, abrasive blasting, sanding painted surfaces and spray painting lead paints. Typical operations where potential overexposure to cadmium may occur include silver brazing or electroplating.

Lead can enter the body through inhalation or ingestion. Chronic lead exposure can damage the nervous system, kidneys, reproductive system and blood forming organs. Lead can be a reproductive hazard for both men

and women. Inhalation of cadmium can cause pulmonary edema. Chronic cadmium exposure may result in lung cancer or kidney damage.

An overexposure to lead occurs when an 8 hour time weighted average (TWA) is at or above 50 mg/m^3, the permissible exposure limit (PEL) for lead, measured at the workers breathing zone. Cadmium overexposure occurs when an employee's 8 hour TWA is at or above the PEL of 5 ug/m3. Blood lead levels should be taken every six months for employees exposed more than 30 days per year to lead above the action level (AL). Annual physicals are required for employees exposed more than 30 days annually to lead or cadmium above the AL. The AL for lead is 30 mg/m^3 and the AL for cadmium is 2.5 mg/m^3. It is good practice to have baseline physicals for employees who will be performing work where they potentially could be exposed to lead or cadmium above the AL.

Steps can be taken to reduce or eliminate an overexposure. If possible materials containing lead or cadmium should be substituted with a less hazardous material. Paints containing less than 0.3 dry weight percent lead should be used for industrial applications and paints containing less than 0.06 dry weight percent lead should be used in residential buildings. If feasible, lead free solders should be used for soldering operations. Welding or brazing should be done with a cadmium free rod.

If substitution is not possible, use administrative or engineering controls. Implementation of work practices and hygiene practices may be required. The control measures for both lead and cadmium are similar. For both stressors this includes having employees change out of street clothes and wear disposable or cloth coveralls. Employees must have a separate locker for street clothes and work clothes. If cloth coveralls are used, the employer must have them laundered. Employees need access to shower facilities. Separate lunch facilities must be provided and employees have to decontaminate before entering the lunch facilities. Employees should not be permitted to eat, drink, smoke or apply cosmetics in a lead or cadmium work or abatement area.

Surfaces should be kept as free as possible from lead accumulation. Dirty coveralls or work surfaces cannot be cleaned with compressed air as this will create airborne lead or cadmium dust. Occupational Safety and Health Administration (OSHA) regulations do not permit dry sweeping or blowing hazardous dust with compressed air. Surfaces should be cleaned by vacuuming with a HEPA vacuum. If vacuuming is not possible wet sweeping or wet brushing can be performed. Warning signs must be posted in lead or cadmium work areas warning people in the areas to stay out and not to eat, drink or smoke in the area.

If employees are exposed to lead above the PEL and up to ten times the PEL then they must wear at least a half mask air purifying respirator with high efficiency particulate air (HEPA) filter cartridges. If the air concentration is up to 50 times the PEL a full face air purifying respirator must be used. If the air concentration is up to 1000 times the PEL a powered air purifying respirator with HEPA filters must be used. If the air concentration is up to 2000 times the PEL a supplied air respirator must be used and for greater or unknown air concentrations a self contained breathing apparatus (SCBA) must be used. For cadmium the above guidelines apply except a powered air purifying respirator with a tight fitting face piece can be used up to 250 times the PEL. If the air concentration of cadmium is greater than 1000 times the PEL then a SCBA must be used.

For more information, contact Vince Fabris, ESC 425 via e-mail at vfabris@nfesc.navy.mil.

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INDUSTRIAL VENTILATION SYSTEM DESIGN COURSE

The Naval Facilities Engineering Service Center will conduct an Industrial Ventilation (IV) Design course at San Diego, California from March 23 to 27, 1998.

This course provides the participant with the fundamental information required to design and test energy efficient industrial ventilation systems. Proper design practices are taught according to methods recommended by the American Conference of Governmental Industrial Hygienist (ACGIH).

Participants of this course include engineers, Industrial Hygienists or others involved in the design, design review process, or testing of industrial ventilation systems. Personnel derive from Engineering Field Divisions (EFD), Public Works Centers (PWC), Resident Officer in Charge of Construction (ROICC) Offices, Naval Medical Clinics, and Safety Centers throughout Naval facilities. Although course materials deal with the basics of air flow, participants should have a strong background in algebra. A scientific calculator is required for this class.

The 4 1/2 day course teaches the basics of industrial ventilation system design and testing with the aid of lectures, slide presentations, videotapes, overhead presentations, and design problems. Topics include applicable regulations and standards, physics of air, hood and duct design, fans, replacement air, air cleaning devices, system testing, and computer applications. Also included is a lesson on filling out Hazardous Abatement (DAP/MIS) funding forms.

For information about the course, please contact Trinh Do via e-mail at tdo@nfesc.navy.mil.

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